

# BCP56 Series

## NPN Silicon Epitaxial Transistor

These NPN Silicon Epitaxial transistors are designed for use in audio amplifier applications. The device is housed in the SOT-223 package, which is designed for medium power surface mount applications.

### Features

- High Current: 1.0 A
- The SOT-223 package can be soldered using wave or reflow. The formed leads absorb thermal stress during soldering, eliminating the possibility of damage to the die
- Available in 12 mm Tape and Reel
  - Use BCP56T1G to Order the 7 inch/1000 Unit Reel
  - Use BCP56T3G to Order the 13 inch/4000 Unit Reel
- PNP Complement is BCP53T1G
- S and NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### MAXIMUM RATINGS (T<sub>C</sub> = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V <sub>CEO</sub>	80	Vdc
Collector-Base Voltage	V <sub>CBO</sub>	100	Vdc
Emitter-Base Voltage	V <sub>EBO</sub>	5	Vdc
Collector Current	I <sub>C</sub>	1	Adc
Total Power Dissipation @ T <sub>A</sub> = 25°C (Note 1) Derate above 25°C	P <sub>D</sub>	1.5 12	W mW/°C
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-65 to 150	°C

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Ambient (surface mounted)	R <sub>θJA</sub>	83.3	°C/W
Maximum Temperature for Soldering Purposes Time in Solder Bath	T <sub>L</sub>	260 10	°C Sec

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

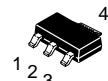
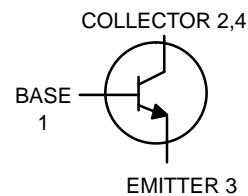
1. Device mounted on a FR-4 glass epoxy printed circuit board 1.575 in x 1.575 in x 0.0625 in; mounting pad for the collector lead = 0.93 sq in.



ON Semiconductor®

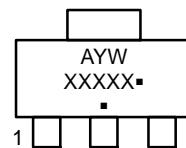
[www.onsemi.com](http://www.onsemi.com)

### MEDIUM POWER NPN SILICON HIGH CURRENT TRANSISTOR SURFACE MOUNT



SOT-223  
CASE 318E  
STYLE 1

### MARKING DIAGRAM



XXXXX = Specific Device Code  
A = Assembly Location  
Y = Year  
W = Work Week  
▪ = Pb-Free Package  
(Note: Microdot may be in either location)

### ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 2 of this data sheet.

## BCP56 Series

ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Characteristics	Symbol	Min	Typ	Max	Unit
-----------------	--------	-----	-----	-----	------

### OFF CHARACTERISTICS

Collector–Base Breakdown Voltage ( $I_C = 100 \mu\text{A}_{\text{dc}}, I_E = 0$ )	$V_{(\text{BR})\text{CBO}}$	100	–	–	Vdc
Collector–Emitter Breakdown Voltage ( $I_C = 1.0 \text{ mA}_{\text{dc}}, I_B = 0$ )	$V_{(\text{BR})\text{CEO}}$	80	–	–	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 10 \mu\text{A}_{\text{dc}}, I_C = 0$ )	$V_{(\text{BR})\text{EBO}}$	5.0	–	–	Vdc
Collector–Base Cutoff Current ( $V_{\text{CB}} = 30 \text{ Vdc}, I_E = 0$ )	$I_{\text{CBO}}$	–	–	100	nAdc
Emitter–Base Cutoff Current ( $V_{\text{EB}} = 5.0 \text{ Vdc}, I_C = 0$ )	$I_{\text{EBO}}$	–	–	10	$\mu\text{Adc}$

### ON CHARACTERISTICS (Note 2)

DC Current Gain ( $I_C = 5.0 \text{ mA}, V_{\text{CE}} = 2.0 \text{ V}$ ) ( $I_C = 150 \text{ mA}, V_{\text{CE}} = 2.0 \text{ V}$ )  ( $I_C = 500 \text{ mA}, V_{\text{CE}} = 2.0 \text{ V}$ )	All Part Types BCP56 BCP56–10 BCP56–16 All Types	$h_{\text{FE}}$	25	–	–	–
			40	–	250	
			63	–	160	
			100	–	250	
			25	–	–	
Collector–Emitter Saturation Voltage ( $I_C = 500 \text{ mA}_{\text{dc}}, I_B = 50 \text{ mA}_{\text{dc}}$ )	$V_{\text{CE}(\text{sat})}$	–	–	0.5	Vdc	
Base–Emitter On Voltage ( $I_C = 500 \text{ mA}_{\text{dc}}, V_{\text{CE}} = 2.0 \text{ Vdc}$ )	$V_{\text{BE}(\text{on})}$	–	–	1.0	Vdc	

### DYNAMIC CHARACTERISTICS

Current–Gain – Bandwidth Product ( $I_C = 10 \mu\text{A}_{\text{dc}}, V_{\text{CE}} = 5.0 \text{ Vdc}, f = 35 \text{ MHz}$ )	$f_T$	–	130	–	MHz
---	-------	---	-----	---	-----

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$

### ORDERING INFORMATION

Device	Marking	Package	Shipping <sup>†</sup>
BCP56T1G	BH	SOT–223 (Pb–Free)	1000 / Tape & Reel
SBCP56T1G*			
BCP56T3G	BH	SOT–223 (Pb–Free)	4000 / Tape & Reel
SBCP56T3G*			
BCP56–10T1G	BH–10	SOT–223 (Pb–Free)	1000 / Tape & Reel
SBCP56–10T1G*			
BCP56–10T3G	BH–10	SOT–223 (Pb–Free)	4000 / Tape & Reel
NSVBCP56–10T3G*			
BCP56–16T1G	BH–16	SOT–223 (Pb–Free)	1000 / Tape & Reel
SBCP56–16T1G*			
BCP56–16T3G	BH–16	SOT–223 (Pb–Free)	4000 / Tape & Reel
SBCP56–16T3G*			

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

\*S and NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC–Q101 Qualified and PPAP Capable.

# BCP56 Series

## TYPICAL ELECTRICAL CHARACTERISTICS

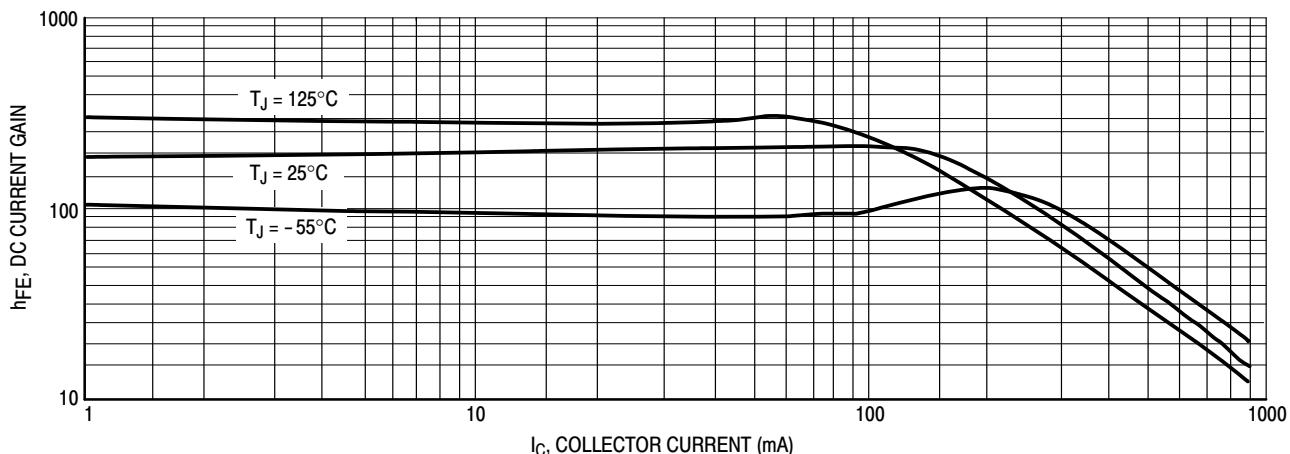


Figure 1. DC Current Gain

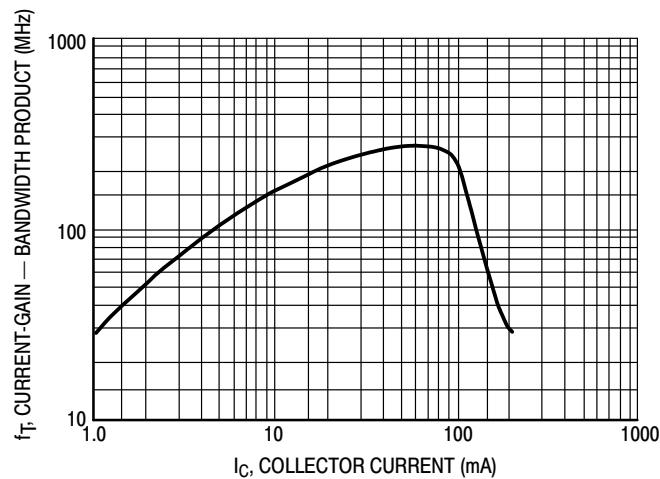


Figure 2. Current-Gain – Bandwidth Product

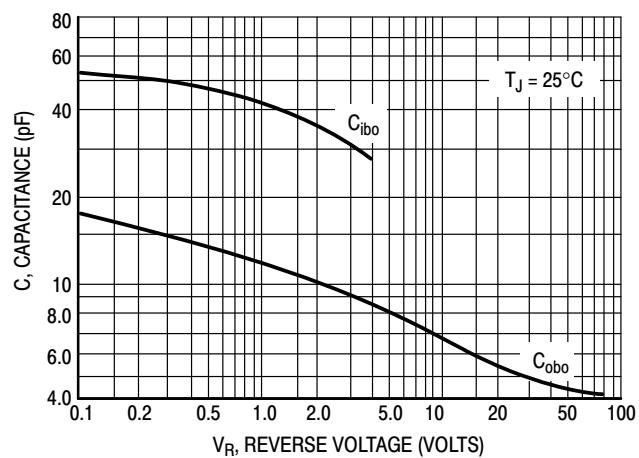


Figure 3. Capacitance

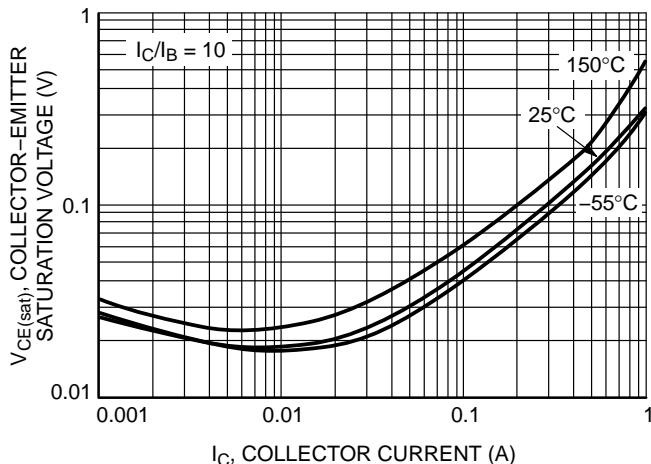


Figure 4. Collector Emitter Saturation Voltage vs. Collector Current

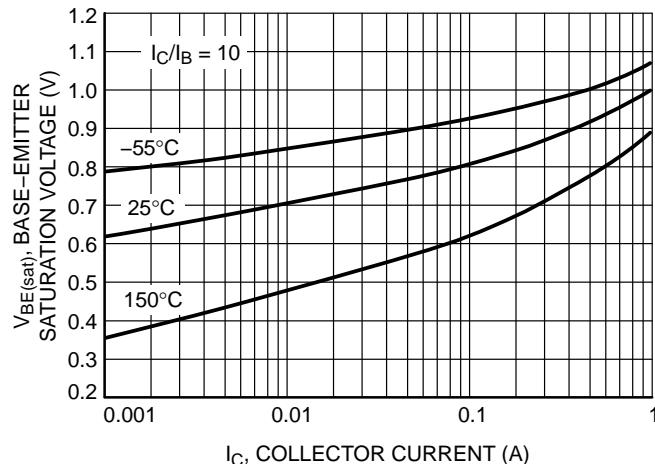


Figure 5. Base Emitter Saturation Voltage vs. Collector Current

# BCP56 Series

## TYPICAL ELECTRICAL CHARACTERISTICS

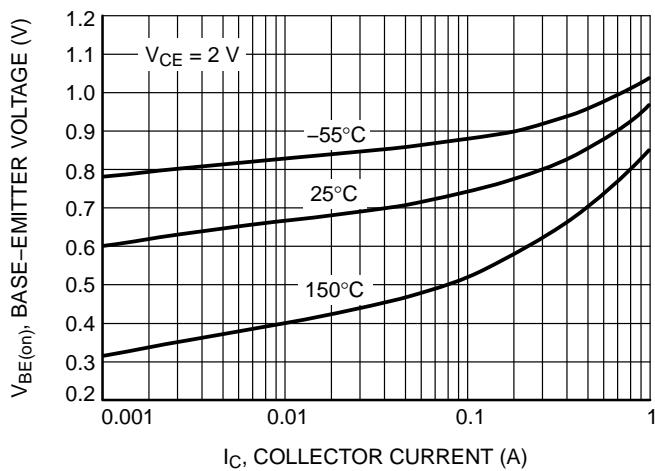


Figure 6. Base Emitter Voltage vs. Collector Current

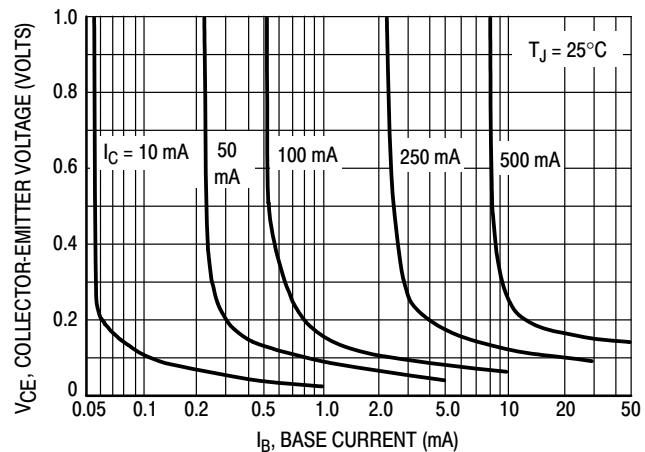


Figure 7. Collector Saturation Region

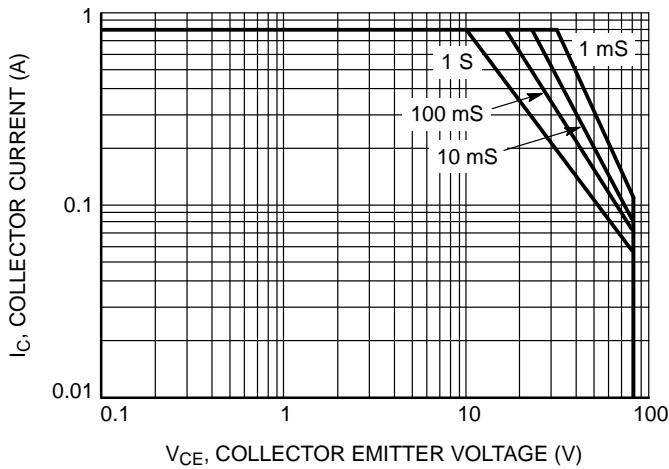


Figure 8. Safe Operating Area

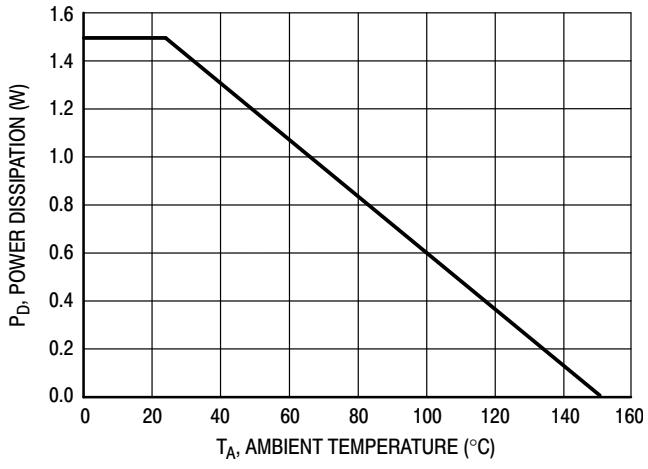
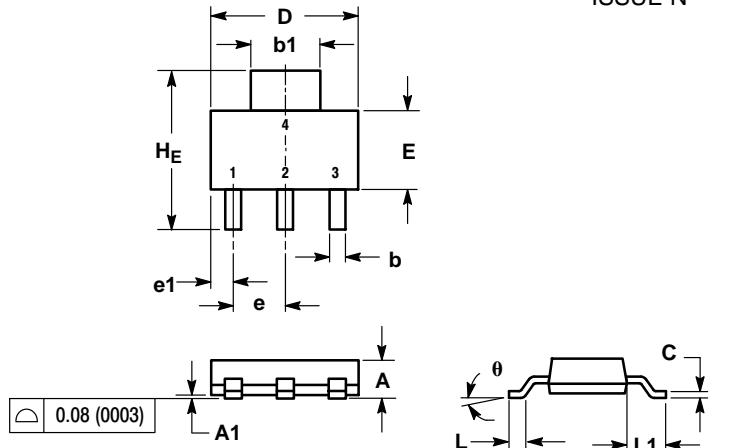


Figure 9. Power Derating Curve

# BCP56 Series

## PACKAGE DIMENSIONS

### SOT-223 (TO-261) CASE 318E-04 ISSUE N



#### NOTES:

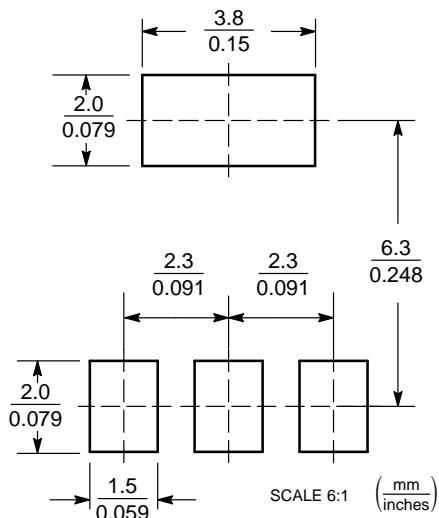
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCH.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.50	1.63	1.75	0.060	0.064	0.068
A1	0.02	0.06	0.10	0.001	0.002	0.004
b	0.60	0.75	0.89	0.024	0.030	0.035
b1	2.90	3.06	3.20	0.115	0.121	0.126
c	0.24	0.29	0.35	0.009	0.012	0.014
D	6.30	6.50	6.70	0.249	0.256	0.263
E	3.30	3.50	3.70	0.130	0.138	0.145
e	2.20	2.30	2.40	0.087	0.091	0.094
e1	0.85	0.94	1.05	0.033	0.037	0.041
L	0.20	—	—	0.008	—	—
L1	1.50	1.75	2.00	0.060	0.069	0.078
H <sub>E</sub>	6.70	7.00	7.30	0.264	0.276	0.287
θ	—	—	—	—	—	—

STYLE 1:  
 PIN 1. BASE  
 2. COLLECTOR  
 3. Emitter  
 4. COLLECTOR

10° 0° 10°

### SOLDERING FOOTPRINT\*



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SODERRM/D.

ON Semiconductor and the  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries. SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

### PUBLICATION ORDERING INFORMATION

#### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
 19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA  
 Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
 Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
 Email: [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

#### N. American Technical Support: 800-282-9855 Toll Free

USA/Canada

#### Europe, Middle East and Africa Technical Support:

Phone: 421 33 790 2910

#### Japan Customer Focus Center

Phone: 81-3-5817-1050

#### ON Semiconductor Website: [www.onsemi.com](http://www.onsemi.com)

#### Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative